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Attorney's Docket No. 6491.P039 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Andrew L. Norrell et al.

Application No.: 10/072,833

Filed: February 6, 2002

Art unit: 2614

Examiner: Singh, Ramnandan P.

For: LOOP EXTENDER WITH SELECTABLE LINE TERMINATION AND EQUALIZATION

Confirmation No.: 3740

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SUPPLEMENTAL APPEAL BRIEF UNDER 37 C.F.R. § 41.37 TRANSMITTAL

Sir:

Enclosed for consideration is a Supplemental Appeal Brief under 37 C.F.R. 41.37, in triplicate, for the above-referenced case. This Brief is submitted in response to the Notification of Non-Compliant Appeal Brief (37 CFR 41.37) mailed from the Patent and Trademark Office on October 31, 2007. The sections in the Supplemental Appeal Brief have been correctly numbered, as noted in the Notification of Non-Compliant Appeal Brief (37 CFR 41.37).

The $510 appeal brief fee was authorized to be charged to Deposit Account No. 02-2666 when the Appeal Brief was electronically filed on July 30, 2007, therefore no additional fee is required at this time. If any other fees are required to process this Brief, please charge Deposit

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Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN, LLP

Dated: 11/9 ,2007

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SUPPLEMENTAL APPEAL BRIEF UNDER 37 C.F.R. § 41.37

This is an Appeal Brief related to an appeal to the Board of Patent Appeals and Interferences from the decision of the Examiner dated June 13, 2007. This Appeal Brief is hereby submitted pursuant to MPEP 1207.04. The Examiner has attempted to re-open the prosecution of this case with new grounds of rejection in light of new art; however, applicants file this Appeal Brief to maintain the current appeal and to address each new ground of rejection. Accordingly, the Appeal Brief filed March 19, 2007 is also hereby incorporated to overcome the previous rejections. This Appeal Brief addresses each new ground of rejection.

Improper re-opening of the prosecution of this application

Also, the applicants traverse the pulling of this case from the appeal's process in light of the 'new art,' which reuse many of the old arguments. Applicants assert that

procedurally that this act was improper and also a clear violation of the purpose of the new changes to the appeal's process. The changes made to the appeal's process according to the comments were in the spirit to reduce the pendency time of patent applications in the patent office rather than as another mechanism to increase the pendency, which is happening in this present application. (See the comments in the Federal Register /Vol. 69 No., 155 page 49963.) Further, the comments state that pulling the case from appeal to reopen the prosecution of the case that "it is envisioned that new grounds of rejection in the Examiner's answer's would be rare, rather than a routine occurrence." The reason why the comments say that a case may be reopened is because "many appellants are making new arguments for the first time in their appeal brief."

In this present case, the claims have not been amended in quite sometime. No new arguments were raised except to respond to concerns initiated by the Examiner and to point out that the references do not disclose the limitations in the claims. The even more troubling fact is that to reopen this case "any new ground of rejection must be personally approved by the Technology center director or designee." Applicants would like an answer as to how this case in light of roughly the same prior art with the same deficient arguments overcome in the last Appeal Brief qualifies as a rare instance of re-opening the case under a "new grounds of rejection."

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the full interest in the invention, 2Wire, Inc.

II. RELATED APPEALS AND INTERFERENCES

Applicant's filed an Appeal Brief on March 19, 2007 and the Examiner is trying to re-open prosecution of this case. Applicants file this current Appeal Brief to keep the appeals process going. To the best of Appellant's knowledge, there are no other appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.

III. STATUS OF CLAIMS

Claims 1-49 are pending in the application. In particular, Claim 18 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Hinman et al (US 6,977,958 B1). Claims 44 and 45 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Shenoi et al (US 6,507,606 B2). Claims 1-5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shenoi in view of Gough et al (US 7,106,854 B2). Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hinman in view of Gough. Claims 18-25 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Mukherjee (US 6,226,322). Claims 1-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee. Claims 44 and 45 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Mukherjee. Claims 10, 26, and 46-49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee as applied to claims 9 and 25. Claims 31-43 stand allowed. Claims 1-30 and 44-49 are the subject of this appeal. A copy of claims 1-49 as they stand on appeal is set forth in the Claims Appendix.

IV. STATUS OF AMENDMENTS

No amendments have been submitted subsequent to the Final Office Action mailed January 19, 2007. This Appeal Brief does address the office action dated June 13, 2007. The Examiner has attempted to re-open the prosecution of this case with

new grounds of rejection in light of new art; however, applicants file this Appeal Brief to maintain the current appeal and to address each new ground of rejection. Accordingly, the Appeal Brief filed March 19, 2007 is hereby incorporated to overcome the previous rejections. This Appeal Brief addresses each new ground of rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This section of this Appeal Brief is set forth to comply with the requirements of 37 C.F.R. § 41.37(c)(1)(v) and is not intended to limit the scope of the claims in any way. Exemplary implementations of the limitations of independent claims 1, 18, 31, 44, and 45 are described below. In general:

Independent claim 1 relates to a system 200 as shown in Figure 2 for improving transmission of digital subscriber line (DSL) signals over a local loop 214-220. The system may include a central office having one or more DSL modems 202, customer premises having one or more DSL modems 204-210 and one or more loop extenders 224-230. (See Figure 2 and Specification paragraphs 0016-0025.)

ADSL uses the frequency band between about 25 kHz and 120 kHz to transmit upstream signals (signals from a customer premises to a central office) from a DSL modem and the frequency band between about 150 kHz to 1.104 MHz to transmit downstream signals (signals from the central office to a customer premises) from a DSL modem. Specification paragraph 0005 and page 3 of 'Understanding Digital Subscriber Line Technology' by Starr a considered prior art reference and incorporated by reference in the Specification in paragraph 0010.

"Moreover, as those skilled in the art will appreciate, central office 202 and each of customer premises 204, 206, 208, and 210 includes a DSL termination device, such

as a DSL modem, for transmitting and receiving DSL signals over an associated local loop." (Specification paragraph 0025)

Referring to Figure 4, a first loop extender 224 may be capacitively coupled via capacitors 364, 366, 372, and 374 to the local loop 214. Referring to Figure 4, the first loop extender 224 may include a plurality of upstream complex impedances 406 coupled in parallel. The first loop extender 224 may include a plurality of downstream complex impedances 408 coupled in parallel. The first loop extender 224 may include a first upstream filter and amplifying element 404 coupled to the plurality of upstream complex impedances 406 via a first switch 414. The first loop extender 224 may include a first downstream filter and amplifying element 402 coupled to the plurality of downstream complex impedances 408 via a second switch 416. (See Figure 4 and Specification paragraphs 0037-0043.)

Independent claim 18 relates to a method of improving transmission of digital subscriber line (DSL) signals over a local loop. A loop extender 224 is configured with a plurality of upstream complex impedances 406 coupled in parallel, a plurality of downstream complex impedances 408 coupled in parallel, a plurality of upstream filter and amplifying elements 404 coupled in parallel and coupled in series with the plurality of upstream complex impedances 406, and a plurality of downstream filter and amplifying elements 402 coupled in parallel and coupled in series with the plurality of downstream complex impedances 408. (See Figure 4 and Specification paragraphs 0037-0043.)

Independent claim 31 relates to a system as shown in Figure 5 for improving transmission of digital subscriber line (DSL) signals over a local loop. The system may

include selectable line termination 406a-d, 408a-d and equalization (SLTE) DSL amplification circuitry 404a-b, 402a-b, capacitively coupled via capacitors 364, 366, 372, and 374 to the local loop 214 via bypass relay switches 510, 512. A plain old telephone service (POTS) loading coil 308 is adapted to be coupled to the local loop 214 for improving transmission of POTS band signals over the local loop 214. (See Figure 5 and Specification paragraphs 0044-0046.)

Referring to figure 6, a diagnostic and control unit 602 coupled via a bypass relay 604 that controls switches 606 to the local loop 214 for receiving and processing control signals from a central office. The a diagnostic and control unit 602 is coupled to the bypass relay switches, shown on figure 5 510, 512, via switch control lines 516-522 and is coupled to the SLTE DSL amplification circuitry 505 via a plurality of switch control lines 516-522 for controlling the SLTE DSL amplification circuitry 505. (See Figures 5 and 6 and Specification paragraphs 0047-0051.)

Independent claim 44 relates to a method for improving transmission of digital subscriber line (DSL) signals over a local loop. Referring to figures 5 and 6, control signals and DSL signals are transmitted over the local loop 214. DSL signal amplification is provided via selectable line termination 406a-d, 408a-d and equalization (SLTE) DSL amplification circuitry 404a-b, 402a-b coupled to the local loop 214. The control signals are received via a diagnostic and control unit (DCU) 602 coupled to the local loop 214. The control signals are processed. The SLTE DSL amplification circuitry switch 505 selects states in accordance with the processed control signals. DSL signals are sampled within the SLTE DSL amplification circuitry 505. The sampled DSL signals are processed. The SLTE DSL amplification circuitry switch 505 selects

states in accordance with the processed sampled DSL signals to improve SLTE DSL amplification circuitry performance. The SLTE DSL amplification circuitry 505 is uncoupled from the local loop 214 in accordance with the processed control signals. (See Figures 5 and 6 and Specification paragraphs 0044-0051.)

Independent claim 45 relates to a system for improving transmission of digital subscriber line (DSL) signals. The system may include means for transmitting control signals 614 and DSL signals 402, 404. The system may include means for providing selectable DSL signal amplification 511, 513 coupled to the means for transmitting 402, 404. The means for receiving the control signals 602 is coupled to the means for providing DSL signal amplification 505. The means for processing the control signals 602 generates processed control signals. The means for improving performance, from the central office 202, of the means for providing DSL signal amplification 505 improves it in accordance with the processed control signals. The means for sampling the DSL signals 614 may be within the means for providing selectable DSL signal amplification 505. The means for processing the sampled DSL signals 614 generates processed sampled DSL signals. The means for improving performance, from the central office 202, of the means for providing DSL signal amplification 505 improves it in accordance with the processed sampled DSL signals. The means for uncoupling 604 the means for providing DSL signal amplification 505 from the means for transmitting 402, 404 uncouples in accordance with the processed control signals. (See Figures 5 and 6 and Specification paragraphs 0044-0051.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

I. WHETHER A PRIMA FACIA CASE TO ESTABLISH THE HINMAN REFERENCE AS A PRIOR ART REFERENCE UNDER 35 U.S.C. § 102(E) HAS BEEN PROPERLY ESTABLISHED?

II. WHETHER ANY DISCLOSURE IN THE HINMAN REFERENCE RELATED TO THE CONCEPTS FOUND IN LANGUAGE OF THE CLAIMS OF APPLICANTS' CURRENT APPLICATION WERE NOT INVENTED BY ANOTHER ENTITY OTHER THAN THE TWO LISTED INVENTORS ON APPLICANTS' CURRENT APPLICATION?

III. WHETHER GOUGH DISCLOSES 'A PLURALITY OF UPSTREAM COMPLEX IMPEDANCES COUPLED IN PARALLEL' AS WELL AS 'A PLURALITY OF DOWNSTREAM COMPLEX IMPEDANCES COUPLED IN PARALLEL'?

IV. WHETHER GOUGH DISCLOSES MERELY ONE SWITCH OR A FIRST AND A SECOND SWITCH?

V. WHETHER SHENIO FAILS TO DISCLOSE NUMEROUS LIMITATIONS IN CLAIMS 44 AND 45?

VI. WHETHER THE CLAIM TERM LOOP EXTENDER WOULD BE INTERPRETED BY THOSE SKILLED IN THE ART OF DSL COMMUNICATIONS TO INCLUDE A DSL MODEM LOCATED IN A SUBSCRIBER'S RESIDENCE?

VII. WHETHER MUKHERJEE DISCLOSES 'CONFIGURING A LOOP EXTENDER'?

VIII. WHETHER MUKHERJEE DISCLOSES 'A SELECTABLE AMPLIFICATION CIRCUIT'?

VII. ARGUMENT

For the purposes of this appeal, the claims stand or fall together.

The Appeal Brief filed March 19, 2007 is hereby incorporated to overcome the previous rejections some of which are duplicated in this new office action dated June 13, 2007. This amendment addresses each new ground of rejection raised in the office action dated June 13, 2007.

Response to Rejections Under 35 U.S.C. § 102(e)

Section 102(e) of 35 U.S.C. specifies that "[a] person shall be entitled to a patent unless ... the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent."

Claim 18

Claim 18 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Hinman. As noted by the Examiner, the applied reference has a common assignee with the instant application.

A prima facia case to establish the Hinman reference as a prior art reference under 35 U.S.C. § 102(e) has not been properly established thereby overcoming any rejection to independent claim 18.

MPEP 2136.03, 2136.02, and 706.02 allow the PTO to rely upon an effective prior art reference date of an earlier filed provisional application to that prior art reference, such as the instant case with Hinman, only if the prior application(s) properly supports the subject matter used to make the rejection of the claims at issue. The MPEP states:

706.02(f)(1) Examination Guidelines for Applying References Under 35 U.S.C. 102(e) [R-5]

(B) Determine if the potential reference resulted from, or claimed the benefit of, an international application. If the reference does, go to step (C) below. The 35 U.S.C. 102(e) date of a reference that did not result from, nor claimed the benefit of, an international application is its earliest effective U.S. filing date, taking into consideration any proper benefit claims to prior U.S. applications under 35 U.S.C. 119(e) or 120 if the prior application(s) properly supports the subject matter used to make the rejection in compliance with 35 U.S.C. 112, first paragraph. See MPEP § 2136.02.

2136.02

II. < REFERENCE MUST ITSELF CONTAIN THE SUBJECT MATTER RELIED ON IN THE REJECTION

When a U.S. patent, a U.S. patent application publication, or an international application publication is used to reject claims under **35 U.S.C. 102(e)**, the disclosure relied on in the rejection must be present in the issued patent or application publication.

2136.03

III. PRIORITY FROM PROVISIONAL APPLICATION UNDER 35 U.S.C. 119(e)

The **35 U.S.C. 102(e)** critical reference date of a U.S. patent or U.S. application publications and certain international application publications entitled to the benefit of the filing date of a provisional application under 35 U.S.C. **119(e)** is the filing date of the provisional application with certain exceptions >if the provisional application(s) properly supports the subject matter relied upon to make the rejection in compliance with **35 U.S.C. 112**, first paragraph<. See MPEP § **706.02(f)(1)**, examples 5 to 9.

Thus, MPEP 2136.03, 2136.02, and 706.02 allow Hinman to have an effective prior art reference date of the earlier filed provisional application only if the prior application(s) properly supports the subject matter used to make the rejection of the claims at issue. Therefore, in order for the Examiner's answer to establish a prima facia

case under 35 USC 102(e) of the limitations found in claim 18, the examiner must actually indicate that the examiner checked the content in the earlier filed provisional patent application and found proper support discussed in that content to disclose every limitation in claim 18. Instead, this Examiner's answer points to text and figures in the issued Hinman reference itself to form the basis of the Hinman rejections and is completely silent on the examiner checking the content in the earlier filed provisional patent application to find proper support discussed in that provisional content to disclose every limitation in claim 18. The prima facia evidence in the Examiner Answer on pages 4-5, to disclose a limitation found in claim 18 cites to disclosure, such as figures and text, in the issued Hinman reference itself. The issued Hinman reference itself does not have a filing date prior to the effective filing date of applicants' current application and therefore does not properly qualify as prior art under 35 USC 102 (e). Applicant's current application claims the benefit of the filing date of a provisional patent application with a filing date of February 6, 2001. The issued Hinman reference has an actual filing date of June 21, 2001 (four months later) and therefore does not qualify as prior art under 35 USC 102 (e). Accordingly, applicants respectfully assert these arguments overcome the rejection of claim 18 under 35 USC 102 (e) in view of the Hinman reference.

ANY DISCLOSURE IN THE HINMAN REFERENCE RELATED TO THE CONCEPTS FOUND IN LANGUAGE OF THE CLAIMS OF APPLICANTS' CURRENT APPLICATION WERE NOT INVENTED BY ANOTHER ENTITY OTHER THAN THE TWO LISTED INVENTORS ON APPLICANTS' CURRENT APPLICATION.

Applicant's current application incorporates the content disclosed in Hinman by reference and shares 2 common named inventors from the Hinman reference. The

Hinman reference has 3 named inventors, Norrell, Hinman and Schley-May. Applicant's current application lists the same inventors except Hinman himself. Hinman did not contribute to the concepts found in the claims of the current application as evidence by the original declaration executed by the two listed inventors, Norrell and Schley-May, when applicant's patent application was filed back in 2002. If Hinman did contribute to the concepts found in the claims of the current application, the law requires that he should have and would have been listed as an inventor. The original declaration executed in this application clearly states that the two listed inventors, Norrell and Schley-May, are the sole joint inventors for the subject matter that is 'claimed' in this current application. Norrell and Schley-May declared this fact under penalty of law. The evidence already in the file wrapper establishes a prima facia case that concepts in the claims of this current application were not invented by another in light of the Hinman reference. Under 37 CFR 1.132, an executed declaration that the subject matter in the claims of this application were not invented by another, namely Hinman, already exists in this file and thereby overcomes the rejection to claim 18. Although not needed to establish a prima facia case that concepts in the claims of this current application were not invented by another, applicants submit a supplemental declaration by the inventors that the claims as they currently stand were not invented by another. Accordingly, applicants assert that the above arguments overcome the rejection to claim 18 in view of Hinman under 35 USC 102 (e).

Claims 1-6

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hinman in view of Gough. Applicants request that Hinman be removed from

consideration as prior art under 35 U.S.C. § 103. Both Hinman and the present claimed invention as claimed, at the time of the invention was made, were owned by the same person or subject to an obligation of assignment to the same person. Both Hinman and the present invention were subject to assignment to 2Wire, Inc. 1704 Automation Parkway, San Jose, CA 95131.

Section 2143 of the United States Patent and Trademark Office's Manual of Patent Examining Procedure states that

> [t]o establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. (M.P.E.P. § 2143 (2006).)

Further, Gough does not disclose several more limitations than the Examiner concedes, for example.

> Claim 1 is independent, and claims 2-9 depend from claim 1. Claim 1 reads:
> A system for improving transmission of digital subscriber line (DSL) signals over a local loop, the system comprising:
> a loop extender capacitively coupled to the local loop, the loop extender comprising:
> a plurality of upstream complex impedances coupled in parallel;
> a plurality of downstream complex impedances coupled in parallel;
> a first upstream filter and amplifying element coupled to the plurality of upstream complex impedances via a first switch; and
> a first downstream filter and amplifying element coupled to the plurality of downstream complex impedances via a second switch.

Gough does not teach 'a plurality of upstream complex impedances coupled in parallel' as well as 'a plurality of downstream complex impedances coupled in parallel' Instead, Gough teaches merely one set of impedances that is used in both the downstream and upstream direction. Gough discloses merely one set of impedances:

ZH1 through ZH4. As shown in figure 2, ZH1 through ZH4 are used in both the downstream and upstream directions (paths 42 and 44). Therefore, the impedances disclosed by Gough are not "downstream" or "upstream" as in claim 1. Furthermore, Gough explicitly states that the selectable hybrid circuitry is situated in the XTU-R. (Col 3, lines 26-28.) Therefore, Gough fails to disclose more than one set of complex impedances. Even if Gough's set of impedances were labeled "downstream" or "upstream," because only one set is disclosed, either Gough fails to disclose a plurality of upstream complex impedances, or it fails to disclose a plurality of downstream complex impedances. Furthermore, Gough teaches merely one switch and thus lacks either the first or second switch of claim 1, which each connect to a separate complex impedance. Accordingly, applicants assert that the above arguments overcome the rejection of claims 1-6 in view of Hinman and Gough under 35 USC 103(a).

Claims 1-5

Claims 1-5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shenoi in view of Gough et al (US 7,106,854 B2). Applicants traverse and respectfully submit that the combination of Shenoi and Gough fails to teach or suggest all claim limitations.

> Claim 1 reads:
> A system for improving transmission of digital subscriber line (DSL) signals over a local loop, the system comprising:
> a loop extender capacitively coupled to the local loop, the loop extender comprising
> a plurality of upstream complex impedances coupled in parallel;
> a plurality of downstream complex impedances coupled in parallel;
> a first upstream filter and amplifying element coupled to the plurality of upstream complex impedances via a first switch; and

a first downstream filter and amplifying element coupled to the plurality of downstream complex impedances via a second switch.

The Examiner asserts that Shenoi teaches all of the elements of claim 1 except a plurality of upstream complex impedances coupled in parallel, a plurality of downstream complex impedances coupled in parallel, and switches for coupling the complex impedances to the filters. The Examiner asserts that Gough teaches all of the missing elements, and that combining the teachings of Gough and Shenoi would have been obvious to a person of ordinary skill in the art. The asserted motivation to combine the references would have been to provide selectable hybrid circuitry that closely matches the particular transmission line impedance on both sides of the loop extender.

As the Examiner noted, Shenoi fails to teach most of the elements of claim 1. Gough also fails to teach most of the elements of claim 1. First, Gough fails to teach a loop extender. The other reference Shenoi makes a clear distinction that Mid span loop extenders also referred to as DSL repeaters in Shenoi, that these forms of loop extender would not be considered a DSL modem located in the central office or a customers premises by one reasonably skilled in the art. (See Shenoi columns 4, 5, and 9) Gough discloses a hybrid circuit for a DSL modem located in a subscriber premises (See Gough claim 1), which is not the same as a loop extender. The hybrid circuit in Gough resides in a modem and by itself would not provide the functionality of a loop extender if deployed at an intermediate point on a transmission line like a Mid span loop extender/ DSL repeater. The discussion of how DSL modems located in the central office and a customers premises would not be considered a loop extender by one skilled in the art will be continued below and has been previously discussed in the past appeal brief and responses to office actions.

Second, Gough fails to teach both a plurality of upstream complex impedances coupled in parallel and a plurality of downstream complex impedances coupled in parallel. Gough discloses merely one set of impedances: ZH1 through ZH4. As shown in figure 2, ZH1 through ZH4 are used in both the downstream and upstream directions (paths 42 and 44). Therefore, the impedances disclosed by Gough are not "downstream" or "upstream" as in claim 1. Furthermore, Gough explicitly states that the selectable hybrid circuitry is situated in the XTU-R. (Col 3, lines 26-28.) Therefore, Gough fails to disclose more than one set of complex impedances. Even if Gough's set of impedances were labeled "downstream" or "upstream," because only one set is disclosed, either Gough fails to disclose a plurality of upstream complex impedances, or it fails to disclose a plurality of downstream complex impedances.

Furthermore, Gough teaches merely one switch and thus lacks either the first or second switch of claim 1. "The plurality of upstream complex impedances [couple] via a first switch and the plurality of downstream complex impedances [couple] via a second switch. Gough teaches merely one switch.

Because Shenoi also fails to teach a plurality of upstream complex impedances coupled in parallel and a plurality of downstream complex impedances coupled in parallel, where each set of impedances is coupled to a switch, the combination of Gough and Shenoi fails to teach these elements. Accordingly, Applicants assert that the combination of Gough and Shenoi does not render claim 1 obvious, and Applicants respectfully request the withdrawal of the rejection of claim 1 under 35 U.S.C. § 103(a). Furthermore, because the combination of references does not render claim 1 obvious, Applicants assert the combination does not render dependent claims 2-5 obvious, and

Applicants respectfully request the withdrawal of the rejection of claims 2-5 under 35 U.S.C. § 103(a).

Claims 44 and 45

According to the United States Patent and Trademark Office Manual of Patent Examining Procedure (M.P.E.P.), "[t]o anticipate a claim, the reference must teach every element of the claim. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (M.P.E.P. § 2131 (2006).) Thus, if a reference fails to teach every element of a claim, the reference does not anticipate the claim.

Claims 44 and 45 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Shenoi et al (US 6,507,606 B2). Applicants do not admit that Shenoi is prior art and reserve the right to swear behind the reference at a later date. Nonetheless, Applicants traverse by respectfully submitting that Shenoi fails to each every element of claims 44 and 45.

> Claim 44 reads:
> A method for improving transmission of digital subscriber line (DSL) signals over a local loop, comprising:
> transmitting control signals and DSL signals over the local loop;
> providing DSL signal amplification via selectable line termination and equalization (SLTE) DSL amplification circuitry coupled to the local loop;
> receiving the control signals via a diagnostic and control unit (DCU) coupled to the local loop;
> processing the control signals;
> selecting SLTE DSL amplification circuitry switch states in accordance with the processed control signals;
> sampling DSL signals within the SLTE DSL amplification circuitry;
> processing the sampled DSL signals;

selecting SLTE DSL amplification circuitry switch states in accordance with the processed sampled DSL signals to improve SLTE DSL amplification circuitry performance; and
uncoupling SLTE DSL amplification circuitry from the local loop in accordance with the processed control signals.

Claim 45 is a means-for claim with elements literally different than claim 44 but similar to those in claim 44 and was rejected by the Examiner for the same reasons. Therefore, the arguments are presented with reference to claim 44, but they apply in a similar manner to the elements of claim 45.

First, Shenoi fails to disclose providing DSL signal amplification via selectable line termination and equalization (SLTE) DSL amplification circuitry coupled to the local loop. The Examiner cites figure 2 and lines 54-60 of column 6 in Shenoi as disclosing this element. However, these lines simply describe how the received signal is processed in the DSL modem, which Shenoi makes a clear distinction that Mid span loop extenders also referred to as DSL repeaters in Shenoi, that these forms of loop extender would not be considered a DSL modem. (See Shenoi columns 4, 5, and 9) Shenoi nowhere addresses the use of a selectable line termination. The 2-wire to 4-wire converter, where Applicants suggest any selectable line termination circuitry would likely reside in the Shenoi patent, is presented and treated as a black box. Thus, because Shenoi fails to disclose selectable line termination circuitry, it also fails to disclose selectable line termination and equalization (SLTE) DSL amplification circuitry.

Second, Shenoi fails to disclose selecting SLTE DSL amplification circuitry switch states in accordance with the processed control signals. Claim 44 states "providing DSL signal amplification via selectable line termination and equalization (SLTE) DSL amplification circuitry coupled to the local loop; receiving the control signals via a

diagnostic and control unit (DCU) coupled to the local loop; processing the control signals; selecting SLTE DSL amplification circuitry switch states in accordance with the processed control signals." The selection of the SLTE DSL amplification circuitry is based upon the received process control signals. The Examiner cites figure 2 and lines 63-67 of column 6 as disclosing this element. However, the cited text merely explains that an echo cancellation filter is used to remove echo, which results when a component of the transmit signal leaks across the 2-wire to 4-wire converter. The cited text has nothing to do with selection of the SLTE DSL amplification circuitry based upon the received process control signals. Nowhere does Shenoi discuss selecting amplification circuitry switch states in accordance with processed control signals, perhaps because Shenoi does not disclose selectable line termination circuitry as discussed above.

Third, because Shenoi fails to disclose SLTE DSL amplification circuitry, by definition it cannot disclose sampling DSL signals with such circuitry. Therefore, the element of sampling DSL signals within the SLTE DSL amplification circuitry is also absent in Shenoi.

Fourth, because Shenoi does not disclose SLTE DSL amplification circuitry switch states, by definition it cannot disclose selecting such switch states in accordance with the processed sampled DSL signals. Therefore, Shenoi does not disclose the penultimate element of claim 44.

Finally, because Shenoi does not disclose SLTE DSL amplification circuitry, by definition it cannot disclose uncoupling such circuitry from the local loop in accordance with processed control signals. Therefore, Shenoi fails to disclose this element.

Thus, Applicants assert that Shenoi fails to disclose at least five elements of

claim 44. Consequently, Shenoi does not anticipate either claim 44 or claim 45, and Applicants respectfully request the withdrawal of the rejections of claims 44 and 45 under 35 U.S.C. § 102(e).

WHETHER THE CLAIM TERM LOOP EXTENDER WOULD BE INTERPRETED BY THOSE SKILLED IN THE ART OF DSL COMMUNICATIONS TO INCLUDE A DSL MODEM LOCATED IN A SUBSCRIBER'S RESIDENCE?

The office action asserts that a remote DSL modem in the Mukherjee patent is a loop extender. The office action also asserts that a DSL modem in a subscriber's residence in the Gough patent is a loop extender.

Claim term interpretation

MPEP 2111 outlines limits on the Examiner's ability to stretch a conveyed meaning of a term found in a claim. Accordingly, MPEP states:

"The broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach."
"[D]uring examination the USPTO must give claims their broadest reasonable interpretation >in light of the specification<.). This means that the words of the claim must be given their plain meaning unless **>the plain meaning is inconsistent with< the specification."
"The ordinary and customary meaning of a term may be evidenced by a variety of sources, >including "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art."< *Phillips v. AWH Corp.*, *>415 F.3d at 1314<, 75 USPQ2d **>at 1327."

The Examiner asserts that the claim term loop extender would be interpreted by those skilled in the art of DSL communications to include a DSL modem located in a subscriber's residence.

The applicants assert that the claim term loop extender would be interpreted by those skilled in the art of DSL communications to include an intermediary node to

extend the loop distance between a central office DSL modem and a customer's premises DSL modem such as a mid span loop extender and a DSL signal repeater but not the DSL modem located in the central office or the customer's premises themselves.

In communication systems, any system needs both a local sender of information and something at a remote location to receive that communicated information. In bi-directional communication systems, you need both a local sender and a remote receiver as well a remote sender and a local receiver. Hence, a transmitter-receiver also known as a modem as one skilled in the art might define these devices is needed in both the local and remote locations. In the context of a DSL communication system, the local DSL modem in the central office and the remote DSL modem at a customer's premises are not a component added at an intermediary node to the communication system to extend the loop distance between the local DSL modem and the remote DSL modem such as the example DSL repeater mentioned in the Mukherjee patent and the mid span loop extender discussed in Shenio. Rather, without the communication system having both a local DSL modem at the broadcasting center, such as a central office, and the remote DSL modem, such as at the person's dwelling/business, then the communication system would not function at all. This is why people skilled in the art differentiate between loop extenders and the central office DSL modem as well as the customer's premises DSL modem.

The MPEP requires that "The broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach."

The office action cites to the reference Shenio, which discloses a form of loop extenders spaced at every 6000 feet (Shenio Text on Figure 5). Shenio makes clear

that a distinction exists between both the central office DSL modem as well as the customer's premises DSL modem from forms of a loop extender such as DSL repeaters and mid span extenders. For example, Shenio states:

> The invention can also include an approach to modify the modems at either end of a DSL (e.g., the Central Office and the Customer Premise) so as to best utilize the fact that there may be repeaters deployed mid-span on the line. As described below in more detail, where the repeaters would be of the form described by U.S. patent application Ser. No. 09/476,770, the invention can provide significant advantages.
> The context of the invention includes digital subscriber loops. One species of digital subscriber loops is an asymmetrical digital subscriber loop. A preferred embodiment of the invention using ADSL repeaters (in place of load coils) enables a form of ADSL that uses the technique of frequency-division-duplexing to be provided to customers over very long loops. (Shenoi Col. 4 Ln 66 – Col. 5 Ln 13).
>
> The underlying principle of the DSL repeater is the need to combat the loss in the actual cable (subscriber loop). This is achieved by introducing gain. Since amplifiers are for the most part uni-directional devices, one approach is to perform a 2 w-to-4 w conversion and put amplifiers in each direction. . . . The repeater may be placed in parallel with a load coil if the DSL needs to coexist with POTS. (Shenoi Col. Col. 5 Lns. 30-47).
>
> Figure 1 shows the ADSL repeater 100 as an intermediary node to extend the loop distance between a central office DSL modem (ADSL transmission unit central) and a customers premises (ADSL transmission unit remote)
>
> The form of extender where load coils are not being replaced is the Mid-Span Extender. Placement of a Mid-Span Extender is not constrained by the placement of load coils but, as a matter of practice, the phone company usually has a manhole or equivalent construction where load coils are (normally) situated and these locations would be logical places for deployment of a Mid-Span Extender as well. When a mid-span extender is employed, the load coil removal would follow normal telephone company practice.
> The basic circuit outline 500 of the Extender unit is shown in FIG. 5.
> The extender unit includes a first 2 w-4 w and a second 2 w-4 w. For the case of a "load coil replacement", the 88 mH inductors 510 would be present and the gains adjusted for compensating for (roughly) 6000 feet of cable. The same circuit arrangement would apply to the

> mid-span extender case wherein the 88 mH coils would not be present and the gains adjusted for X feet of cable (X could be in the neighborhood of 10,000 feet).
> The following section describes relevant aspects of the DMT "data pump". This is to compare and contrast the standardized data pump with the (non-standardized) data pump proposed herein. The essence of the new ADSL method is a better data pump, more in line with the notion of long loop behavior than the standard DMT. In particular, the new ADSL method is very well suited for modems (the ATU-R and the ATU-C) in situations where an ADSL extender (mid-span or at load coil locations) is utilized. (Shenoi Col. 9 Lns 36–63).

Thus, Shenio, who is skilled in the art, makes clear that a distinction exists between both the central office DSL modem as well as the customer's premises DSL modem from forms of loop extender such as DSL repeaters and mid span extenders. Shenio never suggests that the DSL modem in the customers premises could also be form of as DSL repeaters and mid span extenders. Shenio is clear that the DSL repeaters and mid span extenders are an intermediary node to extend the loop distance between a central office DSL modem (ADSL transmission unit central) and a customer's premises modem (ADSL transmission unit remote).

The office action also cites to the reference Mukherjee patent, which itself defines that one skilled in the art considers a form of loop extender, a DSL repeater, as a separate device than the described inventive DSL modems. The Mukherjee patent discloses an inventive DSL modem and its parts as well as discloses a distinctly different apparatus called a DSL repeater that may cooperate with the inventive DSL modem. Thus, Mukherjee discloses:

> Digital subscriber modems (8, 15) for use in Asynchronous Digital Subscriber Line (ADSL) communications are disclosed. Each modem includes a digital transceiver function (10, 13) and an analog front-end function (10, 11), where the analog front-end function (10, 11) is integrated into a single integrated circuit. According to the disclosed

embodiments, the analog front-end functions (10, 11) each include a transmit and a receive side. (Mukherjee, Abstract)

[Claim] 17. A digital subscriber line modem, comprising: [a very long list of internal circuits and other parts] (Mukherjee, independent claim 17 Col. 34 Lns. 7-52)

In any case, according the current state of the art, it is contemplated that ADSL systems will communicate data over a single copper twisted pair at downstream (central office to remote modem) rates on the order of 1.5 Mbps to 6 Mbps, with upstream rates ranging from 16 kbps to 640 kbps. A particular example of the ADSL technology utilizes a downstream (central office to remote) signal bandwidth of 25 kHz to 1104 kHz, and an upstream (remote to central office) signal bandwidth of 25 kHz to 138 kHz; in this realization, echo cancellation is especially necessary at the remote modems. (Mukherjee, Col. 2 Lns. 36-46)

By way of further background, examples of DSL technologies currently being developed include High-Bit-Rate Digital Subscriber Line ("HDSL"), Single-Line Digital Subscriber Line ("SDSL"), and Very-high-data-rate Digital Subscriber Line ("VDSL"). HDSL has a symmetric data transfer rate, communicating at the same speed in both upstream and downstream directions. Current perceived speeds are on the order of 1.544 Mbps of bandwidth, but require two copper twisted pairs. However, the operating range of HDSL is somewhat limited, currently to distances of approximately 12,000 feet or less, beyond which signal repeaters are required. SDSL delivers comparable symmetric data transfer speed as HDSL, but achieves these results with a single copper twisted pair which limits the range of an SDSL system to approximately 10,000 feet. Lastly, VDSL provides asymmetric data transfer rates at much higher speeds, such as on the order of 13 Mbps to 52 Mbps downstream, and 1.5 Mbps to 2.3 Mbps upstream, but only over a maximum range of 1,000 to 4,500 feet. (Mukherjee, Col. 2 Lns. 10-27)

The present invention may be implemented into an analog front-end integrated circuit for digital subscriber line (DSL) modems, particularly for those modems receiving high frequency signals, such as the remote DSL modem._(Mukherjee, Summary of the Invention Col. 3 Lns. 60-65)

Thus, Mukherjee, who is skilled in the art, makes a distinction between both the central office DSL modem as well as the customer's premises DSL modem and forms of

loop extenders such as a DSL signal repeater. The Examiner has previously acknowledged that Mukherjee mentions signal repeaters, which are used to extend the otherwise limited operating loop range of a High-Bit-Rate Digital Subscriber Line (HDSL). The signal repeaters, a form of loop extender, are located on a loop between a central office and the Customer's premises. Overall, Mukherjee does not teach any details, either structural or operational, of the mentioned signal repeaters. Thus, Mukherjee fails to disclose configuring the signal repeater in any way because the disclosure of Mukherjee is limited to simply mentioning, generally, that a signal repeater might be used in a HDSL system rather than discussing its operational and structural characteristics. See the Appeal Brief filed March 19, 2007 for a very lengthy discussion on how one skilled in the art would not consider the modem discussed in Mukherjee a loop extender.

Additionally, most of the prior art patent documents considered by the examiner on the 1449 form discuss 'repeaters' and 'DSL repeaters,' which can be a form of a 'loop extender.' However, not one of those documents considers a central office modem or customer's premises modem a loop extender. For example, two of the prior art patent documents considered by the examiner discuss discrete modems and loop extenders.

United States Published Patent Application number 20020106012 titled "Loop extender with communications, control, and diagnostics." makes it clear that one skilled in the art would not confuse 'a DSL modem' with a 'loop extender.' That Published Patent Application discusses Loop extenders as an intermediate node and the separate devices of DSL modems at each end of the communication loop.

United States Published Patent Application number 20020106076 titled " Line powered loop extender with communications, control, and diagnostics" makes it clear that one skilled in the art would not confuse 'a DSL modem' with a 'loop extender.' That Published Patent Application discusses Loop extenders as an intermediate node and the separate devices of DSL modems at each end of the communication loop.

Thus, the examiner has read and considered many prior art documents on record in this case by people skilled in the art. The documents show differing people skilled in the art will have slightly varying interpretations of the term loop extender as an intermediary node to extend the loop distance between a central office DSL modem and a customer's premises DSL modem. However, the Examiner's interpretation that the claim term loop extender is the customer's premises/ remote DSL modem is completely not consistent with the interpretation that those skilled in the art would reach.

The MPEP also requires that "[D]uring examination the USPTO must give claims their broadest reasonable interpretation >in light of the specification<.). This means that the words of the claim must be given their plain meaning unless **>the plain meaning is inconsistent with< the specification."

Applicants' own specification and drawings make it clear that a DSL modem located in a central office or customer's premises is not a 'loop extender.' Applicants figure 2 shows a system that may include a central office having one or more DSL modems 202, customer premises having one or more DSL modems 204-210 and one or more loop extenders 224-230. (See Figure 2 and Specification paragraphs 0016-0025.) "As those skilled in the art will appreciate, central office 202 and each of

customer premises 204, 206, 208, and 210 includes a DSL termination device, such as a DSL modem, for transmitting and receiving DSL signals over an associated local loop." (Specification paragraph 0025). The loop extender is inserted at some intermediate point along a transmission line. Thus, both ends of a loop extender are connected to the transmission line, as shown in figures 2-5 of Applicants' application [and in figure 5 of Shenoi.]

The MPEP also requires that the Examiner's interpretation of the claim term must be consistent with the words of the claims themselves. The Examiner has tried to narrowly restrict his interpretation of loop extender include merely a remote or customer premises modem rather than any modem because many of the claims require the loop extender to receive control signal over the loop from the central office.

However, the MPEP requires that the Examiner's claim interpretation meet all three requires of 1) the broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach; 2) the plain meaning must not be inconsistent with the specification; and 3) consistent with the words of the claims themselves." The Examiner's claim interpretation of loop extender fails to satisfy at least the first two requirements above.

Based on the evidence on record in this case, the claim term loop extender may not be interpreted to include a DSL modem located in a customer's premises. Therefore, every rejection where Mukherjee and Gough are asserted to disclose a loop extender and various components associated with their loop extender, this is an inappropriate assertion by the Examiner based on the evidence on record in this case.

Claims 18-25

Claims 18-25 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Mukherjee (US 6,226,322). Applicants do not admit that Mukherjee is prior art and reserve the right to swear behind the reference at a later date. Nonetheless, Applicants traverse and respectfully submit that Mukherjee fails to teach all elements of claims 18-25.

Claim 18 reads:

A method of improving transmission of digital subscriber line (DSL) signals over a local loop, comprising:

configuring a loop extender with

a plurality of upstream complex impedances coupled in parallel;

a plurality of downstream complex impedances coupled in parallel;

a plurality of upstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of upstream complex impedances; and

a plurality of downstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of downstream complex impedances.

Claims 19-25 are dependent claims that were not addressed individually by the Examiner.

In the rejection of claim 18, the Examiner cited column 2, lines 10-28 of Mukherjee as disclosing 'configuring a loop extender per claim 18.' However, these lines describe ADSL bandwidth usage, the need for echo cancellation, uses of ADSL, and cost considerations. Mukherjee discloses an analog receive equalizer in a DSL modem in a remote/customer's premises. The disclosed analog receive equalizer does not have a transmission line connected at its input and output, as illustrated by several figures of Mukherjee, including figures 2, 3, and 10. For example, figure 10 of

Mukherjee shows, and the text of the patent explains, that the signal entering the analog receive equalizer is from the line driver. (Col. 25, lines 65-67.) Likewise, the output of the analog receive equalizer is not connected to the transmission line but rather to an analog lowpass filter. (Fig. 10.)

As discussed above and in the previous appeal brief Mukherjee does disclose a form of loop extender, a DSL repeater, but never discloses any of the operational or structural features associated with that DSL repeater.

Claims 44 and 45

Claims 44 and 45 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Mukherjee. Mukherjee does not teach providing selectable DSL amplification or circuitry. In the system of Mukherjee, the DSL amplification is fixed. That is, once the system components are selected in Mukherjee through design, they are not changeable when the device is placed into operation. In opposite, Claim 44 states "providing DSL signal amplification via selectable line termination and equalization (SLTE) DSL amplification circuitry coupled to the local loop; receiving the control signals via a diagnostic and control unit (DCU) coupled to the local loop; processing the control signals; selecting SLTE DSL amplification circuitry switch states in accordance with the processed control signals." The selection of the SLTE DSL amplification circuitry is based upon the received process control signals and not some fixed amplification for that device chosen during the design process. Thus, Mukherjee fails to disclose all of the recited elements in claims 44 and 45. In fact, Mukherjee teaches a fixed amplification which teaches away from a selectable amplification when the device is in operation.

Also, the Examiner asserts that Mukherjee expressly teaches all elements of

claim 44 except sampling digital signals within DSL amplification circuitry, but that such sampling would have been obvious to one of ordinary skill in the art in order to reduce the memory requirement for processing. Applicants respectfully point out that Mukherjee's amplification and impedance matching circuit is an analog circuit (see figure 8 of Mukherjee), and that no memory is required until the analog signal is converted to the digital domain by the analog-to-digital converter. The analog output of the amplification and impedance matching circuit is directed to an analog lowpass filter (58C, figure 4). In turn, the analog output of the lowpass filter is directed to a programmable gain amplifier (60C, figure 4) before the signal is finally sampled by the analog-to-digital converter (62C, figure 4). Because several operations that follow Mukherjee's amplification and impedance matching circuit take place in the analog domain, it is not obvious to Applicants how adding sampling to the amplification and impedance matching circuit could be achieved without significant and non-obvious alterations to the rest of Mukherjee's signal path. Furthermore, Applicants assert that sampling at an earlier stage in the receive signal path would not reduce memory requirements relative to when the sampling takes place later in the signal path. Therefore, Applicants respectfully assert that the motivation provided by the Examiner to modify Mukherjee as specified is insufficient.

Also, the Examiner cites figures 1-3 and lines 26-67 of column 9 of Mukherjee as disclosing 'selecting one of the plurality of complex upstream impedances.' However, figures 1-3 are simply generic block diagrams, and the cited text just describes the blocks and signal flow within a central office modem. Mukherjee fails to disclose any sort of control unit that, in response to control signals received from the central office,

instructs any switch to select one of the plurality of complex upstream impedances. Mukherjee's switches control only resistances (56, figure 8), and therefore Applicants submit that any selection is of a real quantity and not a complex impedance.

For all of the reasons above Mukherjee fails to disclose the limitations in claim 44.

Response to Rejections Under 35 U.S.C. § 103, Single Reference

Section 2143 of the United States Patent and Trademark Office's Manual of Patent Examining Procedure states that

> [t]o establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

(M.P.E.P. § 2143 (2006).) Therefore, to traverse rejections under 35 U.S.C. § 103 when a single reference is used, one must show either (1) there is no suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference, or (2) if such suggestion or motivation exists, there is no reasonable expectation of success (for example, if the reference teaches away from the approach or combination), or (3) the prior art reference fails to teach or suggest all claim limitations.

Claims 1-9

Claims 1-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee. Applicants traverse and respectfully submit that claims 1-9 are not rendered obvious by Mukherjee because Mukherjee fails to teach or suggest all claim limitations, and there is no suggestion or motivation, either in Mukherjee or in the knowledge

generally available to one of ordinary skill in the art, to modify the reference.

Claim 1 is independent, and claims 2-9 depend from claim 1. Claim 1 reads:

> A system for improving transmission of digital subscriber line (DSL) signals over a local loop, the system comprising:
>
> a loop extender capacitively coupled to the local loop, the loop extender comprising:
>
> a plurality of upstream complex impedances coupled in parallel;
>
> a plurality of downstream complex impedances coupled in parallel;
>
> a first upstream filter and amplifying element coupled to the plurality of upstream complex impedances via a first switch; and
>
> a first downstream filter and amplifying element coupled to the plurality of downstream complex impedances via a second switch.

The Examiner asserts that Mukherjee teaches a system for improving transmission of DSL signals over a local loop, the system comprising a loop extender capacitively coupled to the local loop using capacitor C89.

As discussed in the response to the rejection of claims 18-25 under 35 U.S.C. § 102(e), Mukherjee does not disclose or teach a loop extender. Mukherjee discloses an analog receive equalizer in a DSL modem in either a central office or a customer's premises, which is not the same as a loop extender. Thus, Mukherjee fails to teach all limitations of claim 1. Furthermore, Mukherjee provides no motivation or suggestion to modify an analog receive equalizer to make a loop extender, and the Examiner has provided no evidence that the required motivation would stem from knowledge generally available to one of ordinary skill in the art. Thus, Applicants assert that the disclosure of Mukherjee does not render obvious claims 1-9. Accordingly, Applicants respectfully request the withdrawal of the rejections of claims 1-9 under 35 U.S.C. § 103(a).

Claims 10, 26, 46-49

Claims 10, 26, and 46-49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mukherjee as applied to claims 9 and 25. Claim 10 depends from claim 9, which is in a chain of claims that depend from independent claim 1. Claim 26 depends from claim 25, which depends from independent claim 18. Claims 46 and 47 depend from claim 1, and claims 48 and 49 depend from claim 18.

Applicants traverse by respectfully reasserting that Mukherjee does not disclose a loop extender and thus lacks at least one element of each of claims 10, 26, and 46-49. Furthermore, Applicants assert there is no suggestion or motivation, either in Mukherjee or in the knowledge generally available to one of ordinary skill in the art, to modify the Mukherjee to create a loop extender. Thus, claims 10, 26, and 46-49 are not obvious. Accordingly, Applicants respectfully request the withdrawal of the rejection of claims 10, 26, and 46-49 under 35 U.S.C. § 103(a).

Response to Claim Objections

Applicants respectfully submit that the rejections of all base claims from which claims 11-17 and 27-30 depend have been overcome, and that the objections to claims 11-17 and 27-30 have thereby been resolved.

For the reasons stated above, claims 1-49 are patentable over the cited references. Thus, the rejections of claims 1-30 and 44-49 should be withdrawn. Appellant respectfully requests that the Board reverse the rejections of claims 1-30 and 44-49 and since there are no remaining grounds of rejection to be overcome, to direct the Examiner to enter a Notice of Allowance for claims 1-49. Applicants request a prayer for relief because this case has been through many rounds of examination with the examiner, and thus request the Board to direct the Examiner to enter a Notice of Allowance for claims 1-49. If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. (Previously Presented) A system for improving transmission of digital subscriber line (DSL) signals over a local loop, the system comprising:

a loop extender capacitively coupled to the local loop, the loop extender comprising:

a plurality of upstream complex impedances coupled in parallel;

a plurality of downstream complex impedances coupled in parallel;

a first upstream filter and amplifying element coupled to the plurality of upstream complex impedances via a first switch; and

a first downstream filter and amplifying element coupled to the plurality of downstream complex impedances via a second switch.

2. (Original) The system of claim 1, wherein the first switch is configured to select one of the plurality of complex upstream impedances to approximately match the local loop impedance in a first direction along the local loop.

3. (Original) The system of claim 2, wherein the first direction is directed from the loop extender to a central office along the local loop.

4. (Original) The system of claim 1, wherein the second switch is configured to select one of the plurality of complex downstream impedances to approximately match the local loop impedance in a second direction.

5. (Original) The system of claim 4, wherein the second direction is directed from the loop extender to a customer premises along the local loop.

6. (Previously Presented) The system of claim 1, wherein the loop extender further includes:

at least one additional upstream filter and amplifying element coupled in parallel to the first upstream filter and amplifying element; and

at least one additional downstream filter and amplifying element coupled in parallel to the first downstream filter and amplifying element.

7. (Previously Presented) The system of claim 6, wherein a third switch selects either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements to provide upstream DSL signal amplification.

8. (Previously Presented) The system of claim 7, wherein the selection of either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements is based upon local loop length measured from the loop extender to a customer premises.

9. (Previously Presented) The system of claim 6, wherein a fourth switch selects either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements to provide downstream DSL signal amplification.

10. (Previously Presented) The system of claim 9, wherein the selection of either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements is based upon local loop length measured from the loop extender to a central office.

11. (Previously Presented) The system of claim 6, wherein the loop extender further comprises:

a first transformer coupled to the plurality of upstream complex impedances, a first inverting buffer, and either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements via a third switch to couple the plurality of upstream complex impedances, the first inverting buffer, and either the first downstream filter and amplifying element or one of the at least one additional downstream filter and amplifying elements via the third switch to the local loop; and

a second transformer coupled to the plurality of downstream complex impedances, a second inverting buffer, and either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements via a fourth switch to couple the plurality of downstream complex impedances, the second inverting buffer, and either the first upstream filter and amplifying element or one of the at least one additional upstream filter and amplifying elements via the fourth switch to the local loop.

12. (Previously Presented) The system of claim 11, wherein the loop extender further comprises:

a plain old telephone service (POTS) loading coil adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop; and

a diagnostic and control unit coupled to the local loop for providing communications, control, and diagnostic functionality.

13. (Previously Presented) The system of claim 12, wherein the diagnostic and control unit comprises:

a modem coupled to the local loop for communication with a central office;

an analog multiplexer and analog-to-digital converter (AMADC) for controlling the first, second, third, and fourth switches via switch control lines; and

a diagnostic and control processor (DCP) coupled to the modem and the AMADC for processing control signals received via the modem and sending the control signals to the AMADC.

14. (Original) The system of claim 13, wherein the first transformer is coupled to the local loop via a first bypass relay switch and the second transformer is coupled to the local loop via a second bypass relay switch.

15. (Original) The system of claim 14, further comprising a bypass relay for coupling the first and second bypass relay switches to the DCP.

16. (Original) The system of claim 15, wherein the DCP upon receiving control signals from the central office, decouples the first and second transformers from the local loop by activating a deactivated bypass relay.

17. (Original) The system of claim 15, wherein the DCP upon receiving control signals from the central office, couples the first and second transformers to the local loop by deactivating an activated bypass relay.

18. (Previously Presented) A method of improving transmission of digital subscriber line (DSL) signals over a local loop, comprising:

configuring a loop extender with

a plurality of upstream complex impedances coupled in parallel;

a plurality of downstream complex impedances coupled in parallel;

a plurality of upstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of upstream complex impedances; and

a plurality of downstream filter and amplifying elements coupled in parallel and coupled in series with the plurality of downstream complex impedances.

19. (Previously Presented) The method of claim 18, wherein the method comprises selecting one of the plurality of complex upstream impedances to approximately match a local loop impedance in a first direction along the local loop.

20. (Original) The method of claim 19, wherein the first direction is directed from the loop extender to a central office along the local loop.

21. (Previously Presented) The method of claim 18, wherein the method comprises selecting one of the plurality of complex downstream impedances to approximately match a local loop impedance in a second direction along the local loop.

22. (Original) The method of claim 21, wherein the second direction is directed from the loop extender to a customer premises along the local loop.

23. (Previously Presented) The method of claim 18, wherein the method further comprises selecting one of the plurality of upstream filter and amplifying elements to provide upstream DSL signal amplification.

24. (Previously Presented) The method of claim 23, wherein the selection of one of the plurality of upstream filter and amplifying elements is based upon local loop length measured from the loop extender to a customer premises.

25. (Previously Presented) The method of claim 18, wherein the method further comprises selecting one of the plurality of downstream filter and amplifying elements to provide downstream DSL signal amplification.

26. (Previously Presented) The method of claim 25, wherein the selection of one of the plurality of downstream filter and amplifying elements is based upon local loop length measured from the loop extender to a central office.

27. (Previously Presented) The method of claim. 18, further comprising:

configuring the loop extender with

a first transformer for coupling the plurality of upstream complex impedances, a first inverting buffer, and one of the plurality of downstream filter and amplifying elements to the local loop; and

a second transformer for coupling the plurality of downstream complex impedances, a second inverting buffer, and one of the plurality of upstream filter and amplifying elements to the local loop.

28. (Previously Presented) The method of claim 27, further comprising:

improving transmission of plain old telephone service (POTS) band signals over the local loop via a POTS loading coil coupled to the local loop; and

providing communications, control, and diagnostic functionality via a diagnostic and control unit coupled to the local loop.

29. (Previously Presented) The method of claim 28, wherein providing communications, control, and diagnostic functionality comprises:

communicating with a central office via a modem coupled to the local loop;

processing control signals received via the modem;

selecting one of the plurality of downstream complex impedances based upon the processed control signals;

selecting one of the plurality of upstream complex impedances based upon the processed control signals;

selecting one of the plurality of upstream filter and amplifying elements based upon the processed control signals; and

selecting one of the plurality of downstream filter and amplifying elements based upon the processed control signals.

30. (Previously Presented) The method of claim 29, wherein the method further comprises uncoupling the first transformer and the second transformer from the local loop in accordance with the processed control signals.

31. (Previously Presented) A system for improving transmission of digital subscriber line (DSL) signals over a local loop, the system comprising:

selectable line termination and equalization (SLTE) DSL amplification circuitry capacitively coupled to the local loop via bypass relay switches;

a plain old telephone service (POTS) loading coil adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop; and

a diagnostic and control unit coupled to the local loop for receiving and processing control signals from a central office, coupled to the bypass relay switches via a bypass relay for controlling the bypass relay switches, and coupled to the SLTE DSL amplification circuitry via a plurality of switch control lines for controlling the SLTE DSL amplification circuitry.

32. (Previously Presented) The system of claim 31, wherein the SLTE DSL amplification

circuitry comprises:

a plurality of upstream complex impedances coupled in parallel and selectable via a first switch;

a plurality of downstream complex impedances coupled in parallel and selectable via a second switch;

a plurality of upstream filter and amplifying elements coupled in parallel and selectable via a third switch;

a plurality of downstream filter and amplifying elements coupled in parallel and selectable via a fourth switch;

a first transformer to couple the plurality of upstream impedances, the fourth switch, and a first inverting buffer to the local loop;

a second transformer to couple the plurality of downstream impedances, the third switch, and a second inverting buffer to the local loop;

a first non-inverting buffer to couple the first switch and the first inverting buffer to the plurality of upstream filter and amplifying elements; and

a second non-inverting buffer to couple the second switch and the second inverting buffer to the plurality of downstream filter and amplifying elements.

33. (Original) The system of claim 32, wherein the first switch is controlled via a first switch control line, the second switch is controlled via a second switch control line, the third switch is controlled via a third switch control line, and the fourth switch is controlled via a fourth switch control line.

34. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit-is configured to instruct the first switch to select one of the plurality of complex upstream impedances in response to the control signals received from the central office.

35. (Original) The system of claim 34, wherein the one of the plurality of complex upstream impedances selected approximately matches the local loop impedance in a first direction along the local loop.

36. (Original) The system of claim 35, wherein the first direction is directed from the SLTE DSL amplification circuitry to the central office along the local loop.

37. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit is configured to instruct the second switch to select one of the plurality of complex downstream impedances in response to the control signals received from the central office.

38. (Original) The system of claim 37, wherein the one of the plurality of complex downstream impedances selected approximately matches the local loop impedance in a second direction along the local loop.

39. (Original) The system of claim 38, wherein the second direction is directed from the SLTE DSL amplification circuitry to a customer premises along the local loop.

40. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit-is configured to instruct the third switch to select one of the plurality of upstream filter and amplifying in response to the control signals received from the central office.

41. (Previously Presented) The system of claim 40, wherein the one of the plurality of upstream filter and amplifying elements selected is based upon local loop length measured from the SLTE DSL amplification circuitry to a customer premises.

42. (Previously Presented) The system of claim 33, wherein the diagnostic and control unit, in response to the control signals received from the central office, instructs the fourth switch to select one of the plurality of downstream filter and amplifying elements.

43. (Previously Presented) The system of claim 42, wherein the one of the plurality of downstream filter and amplifying elements selected is based upon local loop length measured from the SLTE DSL amplification circuitry to the central office.

44. (Previously Presented) A method for improving transmission of digital subscriber line (DSL) signals over a local loop, comprising:

transmitting control signals and DSL signals over the local loop;

providing DSL signal amplification via selectable line termination and equalization (SLTE) DSL amplification circuitry coupled to the local loop;

receiving the control signals via a diagnostic and control unit (DCU) coupled to the local loop;

processing the control signals;

selecting SLTE DSL amplification circuitry switch states in accordance with the processed control signals;

sampling DSL signals within the SLTE DSL amplification circuitry;

processing the sampled DSL signals;

selecting SLTE DSL amplification circuitry switch states in accordance with the processed sampled DSL signals to improve SLTE DSL amplification circuitry performance; and

uncoupling SLTE DSL amplification circuitry from the local loop in accordance with the processed control signals.

45. (Previously Presented) A system for improving transmission of digital subscriber line (DSL) signals, the system comprising:

means for transmitting control signals and DSL signals;

means for providing selectable DSL signal amplification coupled to the means for transmitting;

means for receiving the control signals coupled to the means for providing DSL signal amplification;

means for processing the control signals to generate processed control signals;

means for improving performance of the means for providing DSL signal amplification in accordance with the processed control signals;

means for sampling the DSL signals within the means for providing selectable DSL signal amplification;

means for processing the sampled DSL signals to generate processed sampled

DSL signals;

means for improving performance of the means for providing DSL signal amplification in accordance with the processed sampled DSL signals; and

means for uncoupling the means for providing DSL signal amplification from the means for transmitting in accordance with the processed control signals.

46. (Previously Presented) The system of claim 1, wherein:

operations of the first upstream filter and amplifying element are combined into a first discrete element; and

operations of the first downstream filter and amplifying element are combined into a second discrete element.

47. (Previously Presented) The system of claim 1, wherein:

operations of the first upstream filter and amplifying element are separated into a first discrete filter element and a first discrete amplifying element; and

operations of the first downstream filter and amplifying element are separated into a second discrete filter element and a second discrete amplifying element.

48. (Previously Presented) The system of claim 18, wherein:

operations of each of the plurality of upstream filter and amplifying elements are combined into a first discrete element; and

operations of each of the plurality of downstream filter and amplifying elements are combined into a second discrete element.

49. (Previously Presented) The method of claim 18, wherein:

operations of each of the plurality of upstream filter and amplifying elements are separated into a first discrete filter element and a first discrete amplifying element; and

operations of each of the plurality of downstream filter and amplifying elements are separated into a second discrete filter element and a second discrete amplifying element.

IX. EVIDENCE APPENDIX

There is no evidence submitted with this Appeal Brief.

X. RELATED PROCEEDINGS APPENDIX

To the best of Applicants' knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.